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A PHOTOSERVOSYSTEM

By

R. I. Polonnikov

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BY: M. I. Polonnikov

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A PHOTOSERVOSYSTEM

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Photoservosystems for training telescopes usually contain a mechanical luminous-flux modulator and, as receivers of the optical radiation, photomultipliers, the use of which limits the operating frequency and shortens the life of the system. Such systems have a fairly complicated control circuit, because of the necessity of introducing additional stabilizing elements.

The proposed photoservosystem, owing to the use of an analyzing pyramid located in the focal plane of the telescope, permits an appreciable simplification of the system, an increase in its accuracy, and a reduction of its dimensions.

The analyzing pyramid directs the luminous flux from a star observed through the telescope to four photoelements which, when they are equally illuminated, give rise to electrical signals of equal value, which offset each other. When the celestial object leaves the field of vision of the telescope, its image begins to illuminate the photoelements unequally and misalignment signals, proportional to the azimuth and altitude of the celestial object, appear at the output of the photoelements.

The photoelements are supplied by atomic batteries, as a result of which there is no need to use photomultipliers and stabilizing elements. For the correction of the entire system an opaque gate with a radioluminescent standard directed toward the vertex of the prism is employed in the design. The gate periodically cuts off the light incident upon the prism from the celestial object and illuminates it with radioluminescent light, which is divided by the pyramid into four equal parts and uniformly illuminates all 4 photoelements. At this moment a commutator connects the amplification circuits to the correction circuits, as a result of which there occurs a self-balancing of the photoservosystem and a check of its operational corrections.

A block diagram of the proposed photoservosystem is shown in the drawing.

The luminous flux from the star (its direction is shown by arrows A) is collected by telescope 1, which is installed in gimbals 2-3, and is directed toward analyzing pyramid 4, the vertex of which is located in the focal plane of the telescope. If the diffraction image of the star illuminates the vertex of the pyramid uniformly, then an equal amount of luminous flux falls on each of the photoelements 5, 6, 7, and 8. In this case the misalignment signals with respect to both stabilization axes (azimuth and altitude), which are summed up from the outputs of the photoelements, will be equal to zero. This corresponds to correct aiming of the telescope at the star.

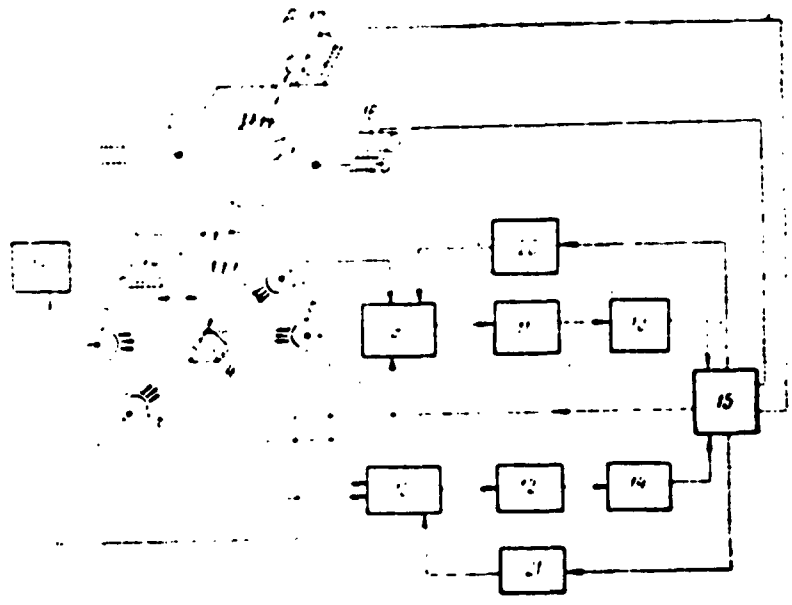
As the celestial object leaves the field of vision of the telescope, misalignment signals occur on the output of photoelements 5, 6 and 7, 8. These signals enter single-stage d-c amplifiers 9 and 10. The amplified signals enter converters 11 and 12, which convert the

d-c signals to a-c, power amplifiers 13 and 14, and then commutator 15, which supplies power to stabilizing motors 16 and 17, in order to aim the telescope at the star.

For the periodic correction of the photoservosystem gate 18, which is constructed of light-proof material, is employed in the design. This gate is moved by electric drive 19, and attached to it on the surface facing the pyramid, is a radioluminescent standard, which provides uniform illumination of the pyramid vertex when the gate is in a strictly fixed position (the position of the gate at the moment of correction is indicated by the dotted figure in the drawing). At this moment commutator 15 connects the tracking circuits to the correction circuits, i.e., switches on units 20 and 21, with the aid of which a self-balancing of the system is accomplished. Then the gate is withdrawn and the commutator connects the tracking circuits to performance motors 16 and 17.

Object of Invention

A photoservosystem for training telescopes, which differs in that, for the purpose of increasing the training precision and simplifying the design, there is located in the focal plane of the telescope an analyzing pyramid, which directs the luminous flux from the star to four photoelements connected in pairs, which are supplied by atomic batteries; for periodic correction of the entire system an opaque gate with a radioluminescent standard, a gate which blocks out the luminous flux, is installed and a feedback circuit is introduced.



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